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FINITE SIZE EFFECTS IN THE STUDY OF EQUATION OF STATE
FOR THE NUCLEI WITH SKYRME FORCE

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ABSTRACT

The equation of state for symmetric nuclear matter and finite nuclei has been investigated using self-consistent Hartree Fock approach. Several versions of Skyrme effective interaction and Hill-Wheeler formula are employed in the calculation. The finite size effect parameter a_F , which is introduced into the Hill-Wheeler formula, is determined by comparing theoretical calculations and experimental results for the zero temperature properties. The dependence of a_F on the effective interaction employed has been studied. It was found that different versions of Skyrme force lead to different values for a_F apart from SKI and SKIII which gave a similar value. Also, the a_F values obtained with Skyrme interaction were different from what was obtained with Gogny force with the exception of SKV interaction which gave a value of $a_F = 0.35$ identical to the value obtained with D1 Gogny interaction. The critical points of the first order phase transition for the nuclear matter and finite size nuclei calculated with the several versions of Skyrme force were different from each other. The largest value of critical temperature for nuclear matter is given by SKV force as $T_c = 39.45$ MeV, while SKIII interaction gives the smallest value as $T_c = 21.65$ MeV. Similarly, the largest value of the critical density is given by SKV interaction. The critical points depend on the number of nucleons in the system and T_c decreases as the number of nucleons in the system decreases.

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TABLE of CONTENTS

1	Introduction	1
2	Nuclear Many-Body System	4
2.1	Nuclear Matter	4
2.2	Nuclear Force	5
2.3	Nuclear Matter Phases	6
3	Mean Field Theory	9
3.1	Hartree Fock Formalism	10
3.2	Skyrme Effective Interaction	14
3.3	Gogny Effective Interaction	15
3.4	Skyrme Hartree Fock Quations	16
3.4.1	The Zero-Range Term	17
3.4.2	The Density Dependence Term	18
3.4.3	The Momentum Dependence Term	19
3.4.4	The Spin-Orbit Term	23
4	The Equation of State Calculation	27
4.1	The Model Description	27

4.1.1	Symmetric Nuclear Matter	28
4.1.2	Finite System	29
4.2	Zero Temperature Properties	31
4.3	Liquid-Gas Phase Transition	34
4.4	Critical Temperature	35
4.5	Chemical Potential	35
5	Results and Discussion	37
5.1	Zero Temperature Properties	37
5.1.1	Infinite Nuclear Matter	37
5.1.2	Finite Size Effect Parameter and Saturation Properties	39
5.2	Liquid-Gas Phase Transition	42
5.2.1	Infinite Nuclear Matter	42
5.2.2	Finite Size Systems	45
6	Summary and Conclusion	49
A	Appendix	54

List of Figures

1	The hierarchy of the nuclear matter structure. Nuclei consist of nucleons (i.e. protons and neutrons) and nucleons consist of quarks	5
2	The collision of two fragments in nuclear matter.	7
3	The temperature of the fragments in a collision of two nuclei (^{197}Au) as a function of the excitation of energy per nucleon. The behaviour of the temperature can be understood as a phase transition in nuclear matter. . . .	8
4	The explanation of the mean field method where particles interact through a self-bound mean field instead of many-body interaction in the initial problem	9
5	The steps to solve Hartree Fock equations self-consistently. Firstly, the single particle states have to be selected. Then, one can compute the mean field Hamiltonian. New states of the single particle are found by diagonalizing the Hamiltonian. This procedure is repeated until the convergence is realized. . .	13
6	The indication of the fermi level distribution, where the energy, ε_i , and the occupation number, n_i , for the single particles are lower than the fermi energy, ε_f	34
7	The energy \sim density isotherms for nuclear matter given by the five sets of Skyrme interaction.	38
8	The energy \sim density isotherms for $^{56}_{28}\text{Ni}$ obtained from Eq.(5.2) with $a_F = 1.0$ and 0.55 given by SKIV interaction.	42
9	The chemical potential \sim density isotherms for nuclear matter given by SKI interaction at different temperatures.	44
10	The chemical potential \sim density isotherms for nuclear matter given by the five sets of Skyrme interaction at $T=16$ MeV.	44

11	The chemical potential \sim density isotherms in different sizes given by SKIV interaction at $T=16.0$ MeV.	47
12	The chemical potential \sim density isotherms for $N=1000$ at different temperatures given with SKII interaction.	47
13	The chemical potential \sim density isotherms in different sizes ($N=100, 1000, 10000$) given with Eq.(4.4) and SKV interaction at $T=16.0$ MeV.	48
14	The chemical potential \sim density isotherms in different sizes ($N=100, 1000, 10000$) given with Eq.(5.2) and SKV interaction at $T=16.0$ MeV.	48

List of Tables

1	The parameters for different versions of Skyrme interaction. The values are taken from Ref.[24].	14
2	The parameters of Gogny D1 effective interaction. The values are taken from Ref.[2].	15
3	The ground state energies for six typical nuclei employing Eq.(4.4) and Gogny interaction found in Ref.[2].	30
4	The saturation properties of nuclear matter calculated with different versions of Skyrme interaction.	38
5	The calculated values of a_F with different versions of Skyrme interaction. . .	40
6	The saturation properties for different nuclei obtained with different versions of Skyrme interaction, where (Exp.) means the experimental data.	41
7	The values of some properties for nuclear matter obtained in Ref.[24] employing several sets of Skyrme interaction, where the effective masses at the critical density and at the saturation density are denoted by $(m^*/m)_c$ and $(m^*/m)_o$, respectively.	41
8	The critical values of the temperature $T_c(MeV)$ and the density $\rho_c(fm^{-3})$ calculated in this work and in Ref.[24] for an infinite nuclear matter with different versions of Skyrme interaction.	43
9	The critical values of the temperature $T_c(MeV)$ and the density $\rho_c(fm^{-3})$ for different sizes calculated with different versions of Skyrme interaction. . . .	46
10	The values of the critical points for different sizes (N=100, 1000, 10000) obtained in a previous study [15] with Eq.(4.4) using Skyrme interaction. . .	46